

# ARGHYA CHATTERJEE

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 <https://arghyachatterjee.github.io>

 <https://www.youtube.com/c/ArghyaChatterjeeJony>

 <https://github.com/ArghyaChatterjee>

A Robotics, Artificial Intelligence (AI), and Machine Learning (ML) researcher experienced in developing Deep Learning (DL) Algorithms in Computer Vision for Object Detection & Pose Estimation for Manipulation with Humanoid Robots in perceptually degraded environments, Advanced Perception Sensor based SLAM for Robot Localization, Mapping, Metric & Semantic understanding of the environment, Risk-aware traversability assessment for autonomous robotic exploration and Swarm Intelligence for multi-robot collaboration & rapid exploration in challenging condition to help take better decision for humans both on earth and on extraterrestrial surfaces like Moon and Mars.

## EDUCATION

- **University of West Florida, Florida, USA**  
Degree: PhD. in Intelligent Systems and Robotics (ISR) Aug 2022 - Present  
CGPA: 3.85/4.00
- **Bangladesh University of Engineering and Technology, Dhaka, Bangladesh**  
Degree: BSc. in Mechanical Engineering Feb 2015 - Sept 2019  
CGPA: 3.14/4.00
- **Khulna Public College, Khulna, Bangladesh**  
Degree: HSC in Science Jul 2012 - Aug 2014  
GPA: 5.00/5.00  
Class Position: 1<sup>st</sup>/60
- **Khulna Bidyut Kendra Secondary School, Khulna, Bangladesh**  
Degree: SSC in Science Jan 2010 - May 2012  
GPA: 5.00/5.00  
Class Position: 1<sup>st</sup>/60

## RESEARCH & PROJECT EXPERIENCE

- **Visiting Student Researcher, NASA JPL**  
DARPA organized RACER Program May 2023 – Present  
Perception Team Leader: Dr. Shehryar Khattak (NASA JPL) California, USA  
Topic: Developing novel computer vision algorithms for providing robust autonomy in Polaris Range Rovers of DARPA as part of **DARPA-funded** RACER (Robotic Autonomy in Complex Environments with Resiliency) program designed for off-road navigation in challenging condition. For Planetary Surface Exploration to Terrestrial Agile Autonomous Robots for Complex terrain Navigation on places like Moon & Mars, the rovers need to deliver critical supplies to astronauts using Lunar Transport Vehicles (LTVs) requiring the intelligence to navigate in dangerous & complex environments with resiliency, agility, and without human intervention.
- **Graduate Research Assistant, IHMC (& ISR Lab)**  
PhD. Thesis in Humanoid Perception (IHMC's Nadia & NASA JSC's Valkyrie) Aug 2022 – Present  
Project Investigator: Dr. Robert Griffin (IHMC) & Dr. Hakki Erhan Sevil (UWF) Florida, USA  
Topic: Developing novel perception algorithms based on NeRFs for 3D rendering, volumetric representation, and mesh generation of objects and surroundings in order to detect & estimate pose of objects for manipulation, localize & map the environment in a combination of metric and semantic fashion, and assess traversability in challenging condition for safe navigation for **ONR (Office of Naval Research) funded** Squadbot platform Nadia and **NASA JSC (Johnson Space Center) funded** Valkyrie Humanoid platform. A fully functional Nadia will be capable of working alongside and in place of soldiers in operations including building search, patrol & bomb disposal.
- **Advisor & Robotics Engineer, Lotus Robotics**  
Research Engineer for ROS-based Autonomous Robotics Projects Oct 2021 – June 2022  
Project Coordinator: Mansurul Haque (Lotus Robotics) Newyork, USA  
Topic: Developed algorithms for Autonomous UGVs for GPS-guided delivery missions, Warehouse Security, Lawn Mowing, Floor Scrubbing, and Autonomous UAVs for agriculture & surveying.
- **Collaborator & Team Member, Team CoSTAR of NASA JPL**  
DARPA organized SubT Challenge Jul 2020 – Jan 2022  
Perception Team Leader: Dr. Benjamin Morrell (NASA JPL) California, USA

Topic: Contributed to “NeBula” autonomy solution for **DARPA-funded** Team CoSTAR from NASA JPL as part of DARPA Subterranean (SubT) Challenge by developing Advanced single and multi-robot SLAM (Simultaneous Localization & Mapping) algorithm, Novel object detection & localization techniques for robots like Boston Dynamics’s quadruped Spot, Clearpath Robotics wheeled UGV Husky, UAV, and Roller-copter equipped with advanced perception sensor.

- **Team Supervisor & Educator, STEMX 365**  
JAXA (& NASA) org. Kibo-Astrobee ISS Robot Programming Challenge Jan 2020 – Present  
Project Coordinator: Mizanul H. Chowdhury (MIT Space Systems Lab) Tokyo, Japan  
Topic: Developed algorithms for autonomous operation of Astrobee (A free-flying robot) inside International Space Station (ISS) avoiding obstacles with 3D perception, following waypoints, and detecting QR & AR Tag.
- **Software Team Leader & Member, Team Interplanetar, BUET**  
ESA organized ERC & Mars Society organized URC Jun 2017 – Sep 2019  
Supervisor: Dr. Md. Ashiqur Rahman (BUET ME) Dhaka, Bangladesh  
Topic: Developed algorithms for **Bangladesh ICT Ministry-funded** projects like GPS-Based Autonomous Mars Rover Navigation for University Rover Challenge (URC) and Way-point & AR Tag-Based Autonomous Mars Rover Navigation for European Rover Challenge (ERC).
- **Researcher & Collaborator, ME, BUET**  
Undergraduate Thesis Mar 2018 – Apr 2019  
Supervisors: Dr. Maglub Al Nur (BUET) and Dr. Muhammad Abir (MIT) Dhaka, Bangladesh  
Topic: Computationally Investigated Pool Boiling IR Images from MIT’s Nuclear Lab for Segmentation of Dry Spots Automatically and Evaluating Performance of Traditional Image Processing and Deep Neural Networks in Quantifying Dry Area Segments Using U-Net.
- **Team Leader, Team Octatron, BUET**  
Undergraduate Project Mar 2017 - Feb 2018  
Supervisors: Dr. M.A. Rashid Sarkar and Musanna Galib (BUET) Dhaka, Bangladesh  
Topic: Built Fire and Flood Fighter Octocopter (UAV) for Extinguishing Fire in Fire Affected Buildings and Areas, and Distributing Flood Relief to people in Flood Affected Zones.
- **Researcher & Technical Leader, Team Out of the Box**  
Microsoft BD Internship Project Jan 2017 - May 2017  
Supervisors: Sonia B. Kabir and Ashikur Rahman (Microsoft) Dhaka, Bangladesh  
Topic: Developed Mobile Application for Earlier Screening of Particular Disability in Children Using Microsoft Products like Azure Cloud Platform and Bing Maps Server.

## TEACHING EXPERIENCE

- **BUET Mars Rover Robotics Team** Oct 2020 - Sep 2021  
*Teaching Assistant at Mars Rover Lab (MRL), BUET* Dhaka, Bangladesh
- **JAXA org. Kibo Astrobee ISS Robot Prog. Challenge** Jan 2020 - Jun 2021  
*Educator & Instructor of Teams from Bangladesh, STEMX 365* Dhaka, Bangladesh
- **National Space Carnival & Camp** Sep 2019 - Jun 2020  
*Instructor & Academic Coordinator for Workshops & Camps* Dhaka, Bangladesh
- **Bangladesh Astronomical Society** Mar 2017 – Apr 2019  
*Instructor for Workshops & Seminars* Dhaka, Bangladesh

## PROFESSIONAL EXPERIENCE

- **Lotus Robotics** Oct 2021– Jun 2022  
Advisor & Robotics Engineer Newyork, USA  
Activities: Worked on Autonomous UGVs for GPS-guided delivery missions, Warehouse Security, Lawn Mowing, Floor Scrubbing, and UAVs for agriculture and surveying.
- **Bangladesh Astronomy Research Collaboration (BARC)** Jan 2020 – Present  
Advisor & Fellow Member Dhaka, Bangladesh  
Activities: Give advice on research activities & how the organization should operate.
- **Youthpreneur Network (A Social Welfare Organization)** Jun 2019 – Jun 2020  
Head of STEM Education & Development Dhaka, Bangladesh  
Activities: Instructed, Organized and Lead Projects, Workshops, Olympiads and Camps in Educational Institutions to Promote STEM Education in Bangladesh.

- American Astronomical Society** Apr 2018 - Mar 2020  
 Country Collaborator & Member Dhaka, Bangladesh  
 Activities: Celebrated International Astronomical Events in Bangladesh and Reported to the  
 Proper AAS Authority for Publishing in their Magazines.

## PUBLICATIONS

- Kamak Ebadi, Lukas Bernreiter, Harel Biggie, Gavin Catt, Yun Chang, **Arghya Chatterjee**, Christopher E Denniston, ..., Luca Carlone, "[Present and Future of SLAM in Extreme Underground Environments](#)," 2022 Journal of IEEE Transactions on Robotics (TRO). **(citation: 22)**
- Yun Chang, Kamak Ebadi, Christopher E Denniston, Muhammad Fadhil Ginting, Antoni Rosinol, Andrzej Reinke, Matteo Palieri, Jingnan Shi, **Arghya Chatterjee**, ..., Luca Carlone, "[LAMP 2.0: A Robust Multi-Robot SLAM System for Operation in Challenging Large-Scale Underground Environments](#)," 2022 IEEE International Conference on Intelligent Robotics and Systems (IROS). **(citation: 20)**
- Matteo Palieri, Benjamin Morrell, Abhishek Thakur, Kamak Ebadi, Jeremy Nash, **Arghya Chatterjee**, ..., Ali-akbar Agha-mohammadi, "[LOCUS: A Multi-Sensor Lidar-Centric Solution for High-Precision Odometry and 3D Mapping in Real-Time](#)," IEEE Robotics & Automation Letters Journal, 2020, vol: 6/2, pp. 421-428. **(citation: 75)**
- Arghya Chatterjee**, M. Galib and M. A. R. Sarkar, "[Application of Arduino in designing modern electromechanical laboratory](#)," 2017 IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI), Chennai, 2017, pp. 222-225.
- Arghya Chatterjee**, S. Dutta, P. Sarkar and A. B. M. A. A. Islam, "[Obstacle Detector for Blind People with Low Cost](#) (Poster Presentation)," Proceedings of 2017 International Conference on Networking, Systems and Security (NSysS), Dhaka, 2017.

## INTERNSHIPS & TRAININGS

- NASA Jet Propulsion Laboratory (JPL)** May 2023 – Present  
*Internship Project: Robustfying Perception Pipeline for DARPA RACER Vehicles* California, USA
- Microsoft Bangladesh Limited** Jan 2017 - May 2017  
*Internship Project: Disabling Disability through Microsoft Products* Dhaka, Bangladesh
- Khulna Power Company Limited** Oct 2018 – Oct 2018  
*Training: Power Plant Visit & Industrial Attachment (3 weeks)* Khulna, Bangladesh

## GRANT WRITING EXPERIENCE

- Topic:** Sensing & Perception Software for Autonomous Manipulation & Utilization Tasks in Space  
**Category:** NASA Small Business Innovation Research (SBIR) Proposal (Topic No: Z5.07) as part of IHMC & Boardwalk Robotics Team.  
**Description:** Moon-to-Mars objectives highlight the need to develop and demonstrate robotic and autonomous systems capable of supporting sustained operations on the lunar surface, in lunar orbit, and eventually on Mars. To achieve the goals of maximum science return and an expanded and sustainable exploration infrastructure, robotic and autonomous systems must be capable of efficient and effective interaction with their in-space environment.  
**Solution Proposed:** Handler: An End-to-End Tool for Semantic-based Manipulation using Affordance Templates using NASA Valkyrie Humanoid Platform for Space Application.

## SKILL SETS

- Prg. Language:** Python, C++, Java, C#, Arduino, Java S, HTML, PHP, CSS, & LATEX.
- Framework & OS:** ROS, ROS2, OpenCV, PCL, Nvidia Isaac SDK, Keras, TensorFlow, PyTorch, Caffe, CUDA, OpenGL, Kubernetes, .NET, Django, Linux, Mac, Windows & Android.
- Software & Tool:** Git, Github, Gitlab, Docker, MIPAR, Solidworks, Ansys, PLC, Blender, Unity & UE 4, Verge3D, Carla Simulator, Microsoft Airsim, Deeplab, OpenPose3D, Meshroom, Meshlab, CloudCompare, Open3D, OpenDroneMap, OpenSpace, Photoshop, Kdenlive & MS Office Family.
- IDE, Compiler & Text Editor:** CodeBlocks, Microsoft Visual Studio, MATLAB, Atom, Jupiter Notebook, PyCharm, Android Studio, Nodejs, IntelliJ IDEA, VS Code & Notepad++.

- **Cloud Platform:** AWS Compute, AWS RoboMaker & Storage, GCP, Google Colab.
- **Hardware:** GPS (RTK), IMU, VLP-16 (3D) & RPLidar (2D) LIDAR, Intel Realsense D200 & 400 series RGBD & L515 Lidar Camera, ZED 3D Camera, Microsoft Kinect Camera, Nvidia Jetson & Intel NUC Boards, Arduino & Raspberry PI Boards, Pixhawk, Ardupilot, VESC, BLDC motor, Nvidia AMD GTX Boards & Oculus Rift S VR Headset.
- **Language Proficiency:** Bangla, English & Hindi.

## AWARDS, HONORS & SCHOLARSHIPS

- **5th Worldwide in Final Round of DARPA SubT Challenge** Sep 2021  
*Awarded to Team CoSTAR of NASA JPL for competing in the final round* Kentucky, USA
- **Special Grant from ICT Division (Ministry) of Bangladesh** Feb 2020  
*Awarded to BUET Mars Rover Lab (MRL) for outstanding performance in robotics* Dhaka, BD
- **Gold Medalist from Duke of Edinburgh International Foundation** Dec 2019  
*Awarded for Outstanding Extra-curricular & Service to the Society* London, UK
- **2nd in Asia & 16th Internationally in European Mars Rover Challenge** Sep 2019  
*Organized by European Space Foundation (ESF) & European Space Agency (ESA)* Kielce, Poland
- **Special Fund & Grant from BUET Alumni Association Trust** Jul 2019  
*Awarded to Team Interplanetar of BUET MRL for competition & robotics research* Dhaka, BD
- **Finalist in IEEE SS12 International Project Competition & Maker Fair** Jul 2017  
*Organized at SS12: Age of Innovation and Maker Fair 2017* Hyderabad, India
- **1st in National Project Show Competition (Senior Category)** May 2017  
*Organized at EEE Day, BUET* Dhaka, BD
- **3rd in Inter University Project Show Competition** Apr 2017  
*Organized at Mechanical Festival, BUET* Dhaka, BD
- **1st in National Poster Presentation Competition** Mar 2017  
*Organized at Robolution, MIST* Dhaka, BD
- **2nd in Inter University Project Show Competition** Nov 2016  
*Organized at CSE Day, BUET* Dhaka, BD
- **1st in All Classes (2002 - 2014)**
  - Primary at Elizabeth M Primary School (2002-2006)
  - Secondary at Khulna BKS School (2009-2012)
  - Junior at Khulna BKS School (2006-2009)
  - H. S. at Khulna Public College (2013-2014)
- **Govt. Merit Scholarship from Education Board of Bangladesh (2006 - 2019)**
  - Primary Scholarship (2006-2009)
  - Secondary Scholarship (2013-2014)
  - Junior Scholarship (2010-2012)
  - H. Secondary Scholarship (2015-2019)
- **Olympiad Achievements**
  - 1 st in Reg. R. of Science Olympiad'14
  - 3 rd in Reg. & 10 th in Nat. R. of Astro-Olympiad'13
  - 1 st in Reg. R. of Zoology Olympiad'14
  - 3 rd in Reg. R. of Math Olympiad'14

## LEADERSHIPS

- **Head** of STEM Education & Development *Youthpreneur Network*
- **Software Team Lead** *Team Interplanetar, BUET*
- **Technical Lead** of Internship Project *Microsoft BD*
- **President** (Senior Rover Mate) *BUET Rover Scout Group*
- **President** *Satyen Bose Science Club, BUET*

## REFERENCES

- **Dr. Benjamin Morrell**  
Perception Team Leader, Team CoSTAR  
Robotics Technologist, NASA JPL .  
Email: [benjamin.morrell@jpl.nasa.gov](mailto:benjamin.morrell@jpl.nasa.gov)
- **Dr. Robert Griffin**  
PhD. Co-Supervisor  
Research Professor & Scientist, IHMC & UWF.  
Email: [rgriffin@ihmc.org](mailto:rgriffin@ihmc.org)
- **Dr. Shehryar Khattak**  
Perception Team Leader, Team X-RACER  
Robotics Technologist, NASA JPL.  
Email: [skhattak@jpl.nasa.gov](mailto:skhattak@jpl.nasa.gov)
- **Dr. Luca Carlone**  
Perception Team Supervisor, Team CoSTAR  
Professor, Dept. of Aero Astro., MIT.  
Email: [lcarlone@mit.edu](mailto:lcarlone@mit.edu)